

SOLANO COUNTY WATER AGENCY

# 2010 Solano County Water Agency URBAN WATER MANAGEMENT PLAN – Final Draft

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SECTION 1 – PLAN PREPARATION .....	4
SECTION 2 – SYSTEM DESCRIPTION .....	6
Service Area Information with 20 Year Projections .....	7
Climatic Information .....	8
Solano County ETo .....	8
Figure 3. Average monthly ETo for selected Solano County cities .....	9
Average Rainfall.....	10
Average Temperatures.....	10
SECTION 3 - SYSTEM SUPPLIES .....	10
Water Sources.....	10
SCWA Water Supply Projections .....	12
Transfer and Exchange Opportunities .....	13
Development of Desalinated Water.....	13
Recycled Water Plan .....	13
Wastewater Quantity, Quality and Current Uses .....	14
Potential and Projected Use, Optimization Plan with Incentives .....	14
Future Water Supply Projects and Programs.....	15
SECTION 4 – SYSTEM DEMANDS.....	16
Water Use by Customer Type .....	16
Water Use Reduction Plan.....	18
SECTION 5 – WATER SUPPLY RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING.....	19
State Water Project Supply.....	19
Solano Project Supply .....	20
Projected Normal Water Year Supply and Demand.....	21
State Water Project.....	22
Solano Project.....	24
WATER SHORTAGE CONTINGENCY PLAN .....	27
Stages of Action .....	27
Estimate of Minimum Supply For Next Three Years .....	27
Catastrophic Supply Interruption Plan .....	28
Solano Project.....	28
State Water Project.....	29
Prohibitions, Penalties and Consumption Reduction Methods .....	29
Analysis of Revenue Impacts of Reduced Sales During Shortages .....	29
Solano Project.....	29
State Water Project.....	29
Draft Ordinance and Use Monitoring Procedure.....	30
Solano Project.....	30
State Water Project.....	31
WATER QUALITY IMPACTS ON RELIABILITY .....	31
State Water Project.....	31
Solano Project.....	31
Section 6: Demand Management Measures .....	32
DMM Description .....	33
A. Water survey programs for single-family residential and multifamily residential customers .....	33

B. Residential plumbing retrofit .....	33
C. System water audits, leak detection, and repair .....	33
D. Metering with commodity rates for all new connections and retrofit of existing connections .....	34
E. Large landscape conservation programs and incentives. ....	34
F. High-efficiency washing machine rebate program .....	34
G. Public information programs .....	34
H. School programs .....	34
I. Conservation programs for commercial, industrial, and institutional accounts .....	35
J. Wholesale agency programs .....	35
K. Conservation pricing .....	36
L. Water conservation coordinator .....	36
M. Water waste prohibition .....	36
N. Residential ultra-low-flush toilet replacement programs .....	36

## SECTION 1 – PLAN PREPARATION

*Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable (10620(d)(2))*

The Solano County Water Agency (SCWA) is a wholesale water agency that provides untreated water to cities and agricultural districts in Solano County from the Federal Solano Project and the North Bay Aqueduct of the State Water Project. SCWA is not an urban water supplier as defined by the Water Code and is not required to submit an Urban Water Management Plan (UWMP) but does so on a voluntary basis. The Agency views the UWMP as a valuable planning tool and continues to update it to keep it current and relevant.

Retail agencies within Solano County that are required to submit an UWMP will do so individually. Other documents related to the UWMP are the Solano Agencies' Integrated Regional Water Management Plan (February 2005) and the SCWA Water Management Plan (June 2005), the latter prepared to meet the requirements of our federal water supply from the Solano Project and will also be updated in 2011. The SCWA Water Management Plan will be prepared in conformance with guidelines prepared by the United States Bureau of Reclamation (USBR).

In preparing the UWMP, SCWA coordinated with appropriate agencies. Table 1 lists those agencies.

**Table 1. Coordination with Appropriate Agencies**

Coordinating Agencies	Participated in UWMP Development	Commented on the Draft Report	Attended Public Meetings	Contacted for Assistance	Sent Copy of the Draft Report	Sent Notice of Intention to Adopt	Not Involved/No Information
City of Vallejo			X		X	X	
City of Fairfield		X	X		X	X	
City of Suisun City			X		X	X	
City of Benicia			X		X	X	
City of Vacaville			X		X	X	
City of Rio Vista			X		X	X	
California Water Service Company					X	X	
City of Dixon			X		X	X	
Solano County			X		X	X	
Solano Irrigation District			X		X	X	
Suisun Solano Water Authority			X		X	X	
Dixon Solano Municipal Water Service			X		X	X	

Additionally, SCWA participates in San Francisco Bay Area regional water management discussions and participated in the development of a Bay Area Integrated Regional Water Management Plan. The Agency is also a member of the Sacramento Valley Westside IRWMP.

Extensive discussions were held with SCWA member agencies on the water supply assumptions for the State Water Projects Supply and Solano Project Supply.

SCWA uses a wide variety of water management tools and options to maximize resources and minimize the need to import water. As previously mentioned, SCWA has completed an Integrated Regional Water Management Plan, a USBR Water Management Plan and is participating in both the Bay Area Integrated Water Management Plan as well as the Sacramento Valley Westside IRWMP.

SCWA and its member agencies have comprehensive urban and agricultural water conservation programs. Water exchanges and transfers are documented in the Solano Agencies' Integrated Regional Water Management Plan. These exchanges and transfers within Solano County maximize local resources and minimize the need for additional new imported water supplies. However, longer term projections show there may be a need for additional imported water supplies.

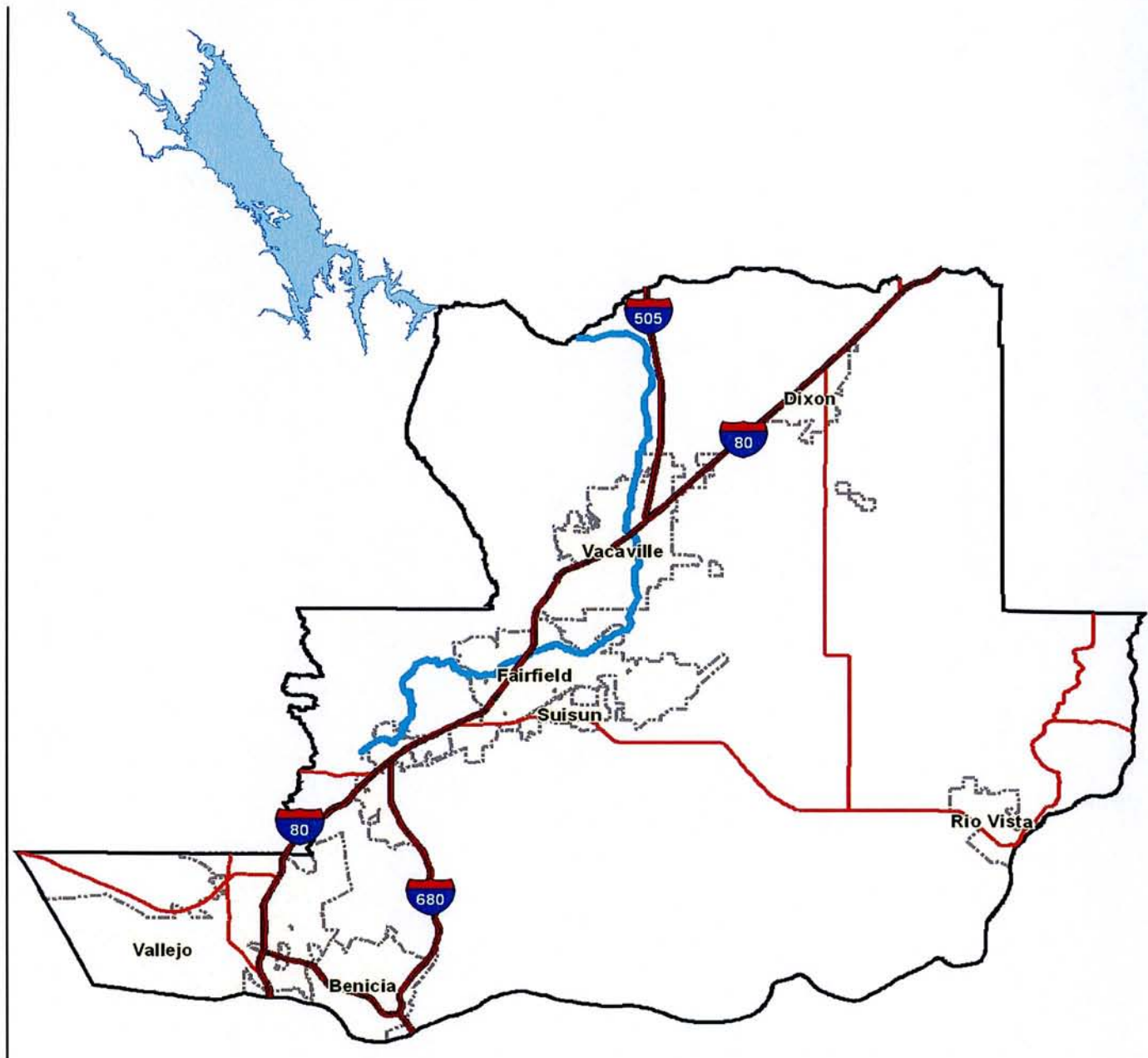
***Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision (10621(b))***

An e-mail notification that SCWA was reviewing and considering amendments or changes to its Urban Water Management Plan was sent on March 4, 2011 to all entities that are provided water from the Agency.

Exhibit \_\_\_ is a copy of the action of the Board of Directors of the Solano County Water Agency adopting the UWMP

## SECTION 2 – SYSTEM DESCRIPTION

*Describe the service area of the supplier 10631(a)*



**Figure 1. Solano County showing the seven incorporated cities.**

According to the U.S. Census Bureau, Solano County has a land area of 829 square miles and water area of 78 square miles. San Francisco Bay, Suisun Bay, the Carquinez Straits and the Sacramento River provide the county with natural borders to the south and west. The county also contains the Suisun Marsh, which is the largest contiguous brackish water wetland in the western United States and a protected habitat.

The boundaries of Solano County were set on February 18, 1850 by the first elected legislature of the territory of California, making Solano County one of the original 27 counties. There are seven cities in the county as well as a major military installation – Travis Air Force Base. Two of the county's seven cities, Benicia and Vallejo, served as the State's Capital in the early 1850s.

In 1984 the voters of the county passed the Urban Growth Initiative, Measure A, which limits most urban growth to incorporated cities. Subsequent elections extended the mandates from the original Urban Growth Initiative to the present. As a result 95% of Solano County residents live within the county's seven cities compared to a statewide average of 83%. Additionally, the cities of Vallejo and Benicia have limited geographical area to expand and growth in these areas is expected to be small. Although overall growth has slowed due to economic conditions, the other cities, Fairfield, Vacaville, Suisun City, Dixon and Rio Vista are expected to continue to see increases in population in the future as there is suitable land available for urban growth.

Rich agricultural land lies in the northern part of the county while rolling hills are part of the southern area. Approximately 62% of the county land area is comprised of farmland. Statewide, Solano County ranked 26th out of 58 counties in agricultural production. The county ranked second among California counties in the production of Sudan grass hay, sheep and lambs and fourth in the production of grain hay and salad greens. Agricultural water use is expected to remain constant as there are some new areas coming under irrigation, but there is an off-setting amount of agricultural land being replaced by urban growth.

There are other demographic features affecting water management such as housing density, future commercial and industrial development, or projected income levels. The UWMP's for the cities contain more detail on growth projections and factors that are impacting urban growth.

### Service Area Information with 20 Year Projections

*(Describe the service area) current and projected population . . . The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier . . . (10631(a)). (population projections) shall be in five-year increments to 20 years or as far as data is available (10631(a)).*

Table 2 and Figure 2 shows current and projected population for the SCWA service area which includes all of Solano County. These data are Solano County projections provided by the California Department of Finance.

**Table 2. Population – Current and Projected**  
*Source: California Department of Finance with 2010 Census data*

	2010	2015	2020	2025	2030
SCWA Service Area Population	413,300	421,500	432,000	443,000	454,000

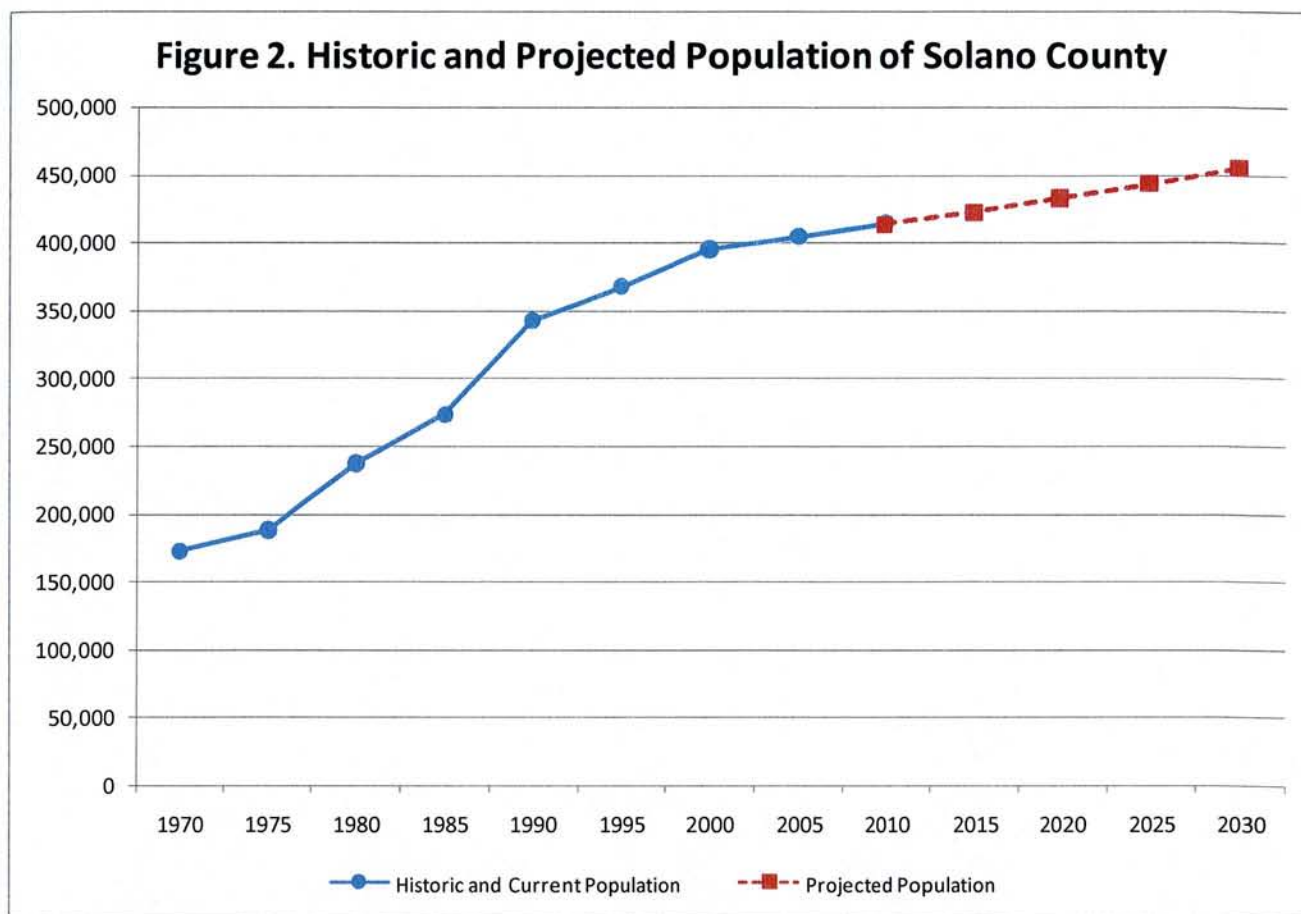


Figure 2. Solano County Population – Historic and Projected

## Climatic Information.

Solano County climate varies spatially depending mainly on the effects of topography on rainfall distribution. The eastern parts of the County (Sacramento Valley/Sacramento and Suisun Bay watersheds) are classified as having a Mediterranean/hot summer climate while the western portions (Napa River/San Pablo Bay watersheds) are characterized by a Mediterranean/cool summer climate.

## Solano County ETo

Solano County lies within two hydrologic regions with the western part of the county in the San Francisco Bay Region and the eastern portion in the Sacramento River Region. Since Solano County is part of two hydrologic regions it is not feasible to list an “average” ETo for the entire county. The eastern portion of the county has similar climatic conditions as the Sacramento Valley characterized by mild winters and hot summers with periods of above 90 °F days. In contrast the southern and western sections have more in common with the San Francisco Bay Area. The two cities in south county, Benicia and Vallejo, have inland coastal maritime climates typified by cool, wet winters with significant periods of fog and warm, dry summers with frequent cooling sea breezes. Fairfield, due to its location near the dividing line

between the San Francisco Bay Region and the Sacramento River Region, has average climatic conditions that lie between the two.

This is borne out by an examination of annual ETo data (Figure 3). Dixon, located in eastern Solano County has an annual ETo of 52.1, comparable to Sacramento at 51.9. In southwest Solano County, Benicia has an annual ETo of 40.3 which is similar to the Oakland foothill's annual ETo of 39.6. Fairfield's annual ETo of 45.2 is halfway between that of Dixon and Benicia.

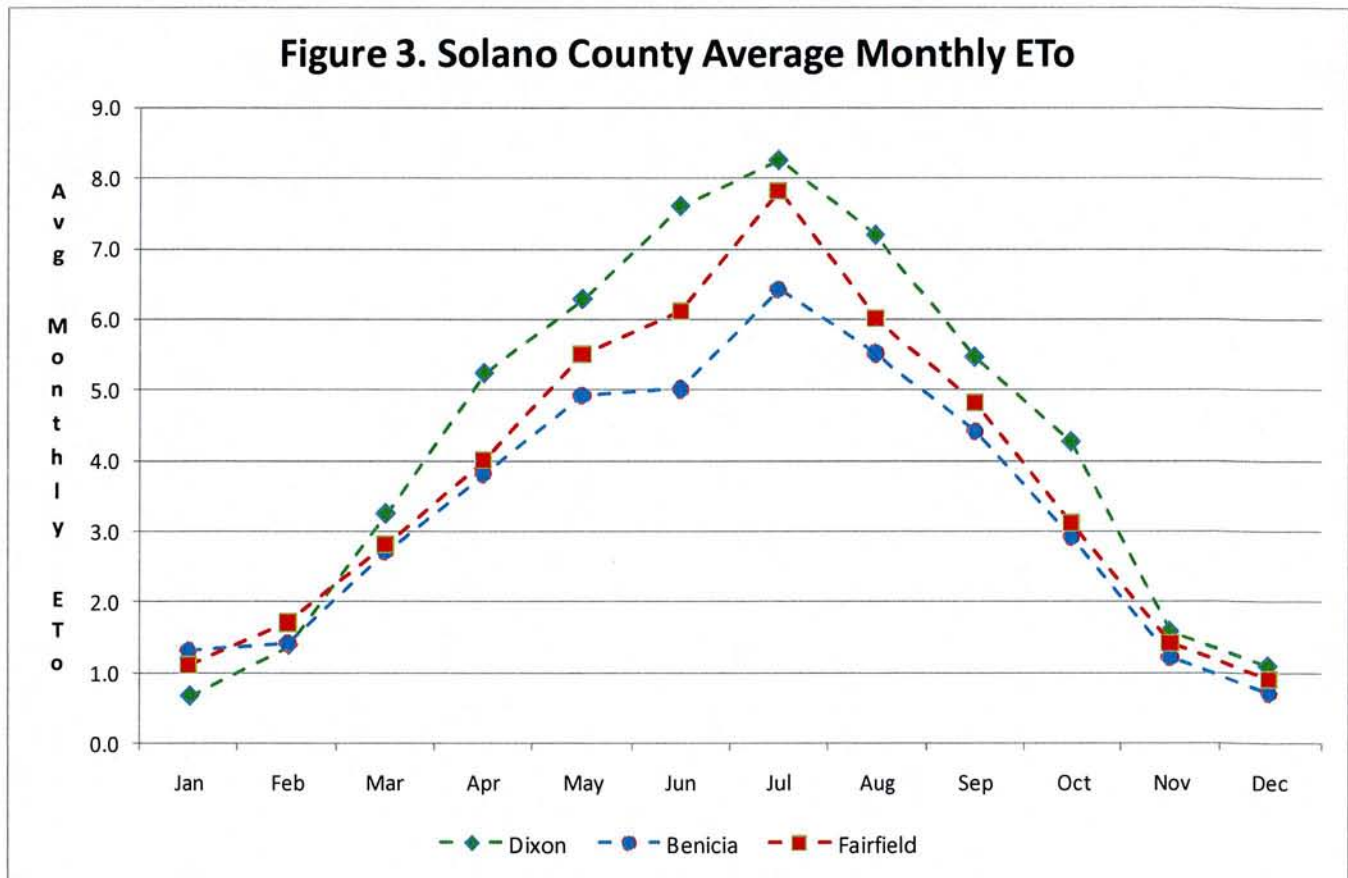


Figure 3. Average monthly ETo for selected Solano County cities.

## Average Rainfall

The average annual precipitation in the eastern lowland areas of Solano County is typically between 15 and 25 inches, with higher rainfall amounts reaching 25 to 40 inches in the western hills. Average rainfall for selected Solano County cities is shown in Figure 4.

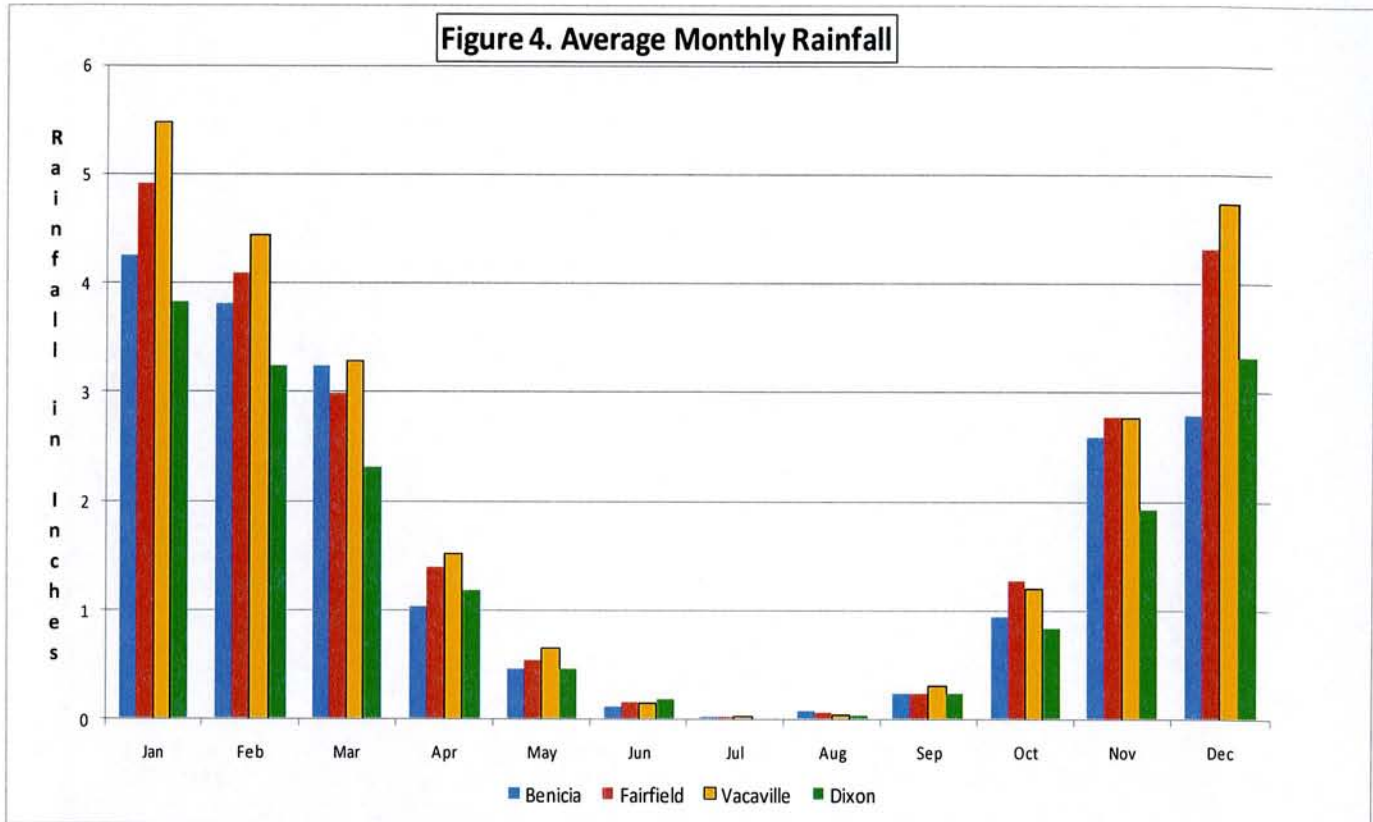


Figure 4. Average Monthly Rainfall for Selected Solano County Cities

## Average Temperatures

Solano County temperatures range from an average of 45 °F in January to mid-70s °F in July. During summer months (June to September) eastern portions of the county may experience several days where temperatures exceed 90 °F.

## SECTION 3 - SYSTEM SUPPLIES

*Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a) (10631(b)).*

### Water Sources

SCWA serves as a water wholesaler for the Solano Project and the State Water Project (SWP). The Solano Project is a federal project with the Bureau of Reclamation (USBR) that stores water in Lake Berryessa for delivery to users throughout the region. Local agencies and USBR first conceived the project in the 1940s and 1950s to meet the increasing water demands of agriculture, municipalities, and

military facilities Solano County. The Solano Project first delivered water in 1959. The major facilities are:

- Monticello Dam, which captures water from Putah Creek in Lake Berryessa;
- Putah Diversion Dam, which diverts water out of Lower Putah Creek just downstream of Monticello Dam; and
- Putah South Canal, which delivers water to local agencies. The Putah South Canal is 33 miles long, concrete lined and has a maximum capacity of 956 cubic feet per second.

SCWA has water contracts to deliver this water for municipal and agricultural uses to Fairfield, Suisun City, Vacaville, Vallejo, Solano Irrigation District, Maine Prairie Water District, University of California at Davis, and California State Prison – Solano.

The SWP has rights to water originating from the Sacramento and San Joaquin Rivers, and it stores water in Lake Oroville (on the Feather River). The SWP provides water to SCWA through the North Bay Aqueduct (NBA). The NBA is a 27-mile long pipeline that delivers untreated municipal water from Barker Slough in the Sacramento-San Joaquin delta to Napa and Solano Counties. The NBA is operated by DWR for the benefit of SCWA and the Napa County Flood Control and Conservation District (Napa County FC&CD).

SCWA has a contract with DWR for water supply from the SWP. In turn, SCWA has contracts with Solano cities for provision of this water supply. The NBA contracting cities are Benicia, Vacaville, Fairfield, Vallejo, Suisun City, Rio Vista, and Dixon. The city of Suisun City has an allocation of NBA water but has no facilities to take NBA water at this time. The cities of Rio Vista and Dixon have the right to obtain a specified amount of NBA water in the future, but have no facilities to take NBA water at this time. SCWA has contracted for an ultimate allocation of 47,756 acre-feet of water per year from the SWP.

Table 3 shows the two water supply sources for SCWA: the USBR Solano Project and the California Department of Water Resources (DWR) SWP. The contracted water supply (plus operational losses) for the Solano Project total 207,350 acre feet per year. This roughly matches USBR's calculation of "firm yield". Firm yield is the calculated amount of water supply available during the driest hydrologic period of record for the project. The table shows contract amounts and does not reflect potential deficiencies in supplies due to drought and other conditions.

SCWA does not provide groundwater supplies nor does it provide any other water supplies beyond the two wholesale sources. See each individual city's UWMP for details about other supplies used in Solano County.

**Table 3. Current and Planned Water Supplies – AF/Y**

Water Supply Sources	2010	2015	2020	2025	2030
Wholesale water providers					
USBR Solano Project	207,350	207,350	207,350	207,350	207,350
DWR State Water Project	47,506	47,756	47,756	47,756	47,756
Supplier produced groundwater					
Supplier surface diversions					
Transfers in or out					
Exchanges in or out					
Recycled water (current and projected use)					
Desalination					
Other					

## SCWA Water Supply Projections

*Urban water suppliers that rely upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c) (10631(k)).*

SCWA has provided information to our retailing agencies about the availability and reliability of our wholesale supplies - the State Water Project and Solano Project. Based on information provided by DWR and USBR, SCWA has determined that in a normal year, SWP reliability is considered be about 64% and the Solano Project has a reliability of 99% (see Table 6).

Existing Water Supply Sources in Normal Water Years					
	2010 (1)	2015	2020	2025	2030
State Water Project	30,386	30,564	30,564	30,564	30,564
Solano Project	205,276	205,276	205,276	205,276	205,276

(1) Actual deliveries

## **Transfer and Exchange Opportunities**

*Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis (10631(d)).*

SCWA, as a wholesaler, does not conduct exchanges or transfers on its own. SCWA does facilitate and assist cities and districts in transfers and exchanges.

A thorough discussion of current transfers and exchanges is included in the Appendix A of the 2005 Solano Agencies' Integrated Regional Water Management Plan.

SCWA had an agreement with Mojave Water Agency to exchange wet weather SWP water for dry year SWP water. According to the agreement, SCWA (or its member units) can exchange two units of SWP water for a future return of one unit of SWP water to be provided at the Delta by Mojave.

The agreement with Mojave was terminated in 2007. However Benicia still has access to 2,000 AF of banked water. One thousand AF must be recovered by 2014, and the remaining 1,000 AF must be recovered by 2015 or Benicia loses the rights to the water.

## **Development of Desalinated Water**

*Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply (10631(i)).*

There are potential opportunities for development of desalinated water in Solano County including waters from the San Francisco Bay and treated wastewater. Some wastewater in Solano County has a high salt content which makes recycling difficult. One of SCWA's member units, the City of Vacaville, is considering a desalination process as part of a wastewater recycling project.

Currently there are no planned desalination projects in Solano County. They could be pursued if grant funding becomes available or other actions are taken to improve the economics of such projects. The Agency does not have any quantification about the volume of desalinated water available from these types of projects.

## **Recycled Water Plan**

*Provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area (10633).*

Solano County Water Agency does not collect, treat, produce or distribute recycled water and has no involvement in wastewater treatment or water recycling. Recycled water treatment and distribution is managed by the cities and wastewater special districts within the county. For details of wastewater collection and treatment systems, quantities treated, excess recycled water capacity not currently being distributed to non-potable customers, and type, place, and quantity of use, refer to the individual cities UWMP's.

Recognizing that recycled water can be an important component of the county's complete and balanced water supply program, SCWA has incorporated its use by the cities into the 2005 Solano Agencies' Integrated Regional Water Management Plan. However, the Solano Agencies have decided that any discussion regarding specific details on recycled water use should be conducted in the cities' individual UWMPs.

SCWA is committed to continually supporting the search for safe, economically feasible and publicly acceptable methods to increase local water resources by maximizing the use of recycled water. The Agency will continue to work cooperatively with the cities towards that end.

## **Wastewater Quantity, Quality and Current Uses**

*(Describe) the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal (10633(a)).*

Currently, within Solano County, the city of Fairfield has the most active wastewater recycling program. Wastewater in that city is treated at a facility operated by the Fairfield-Suisun Sewer District. The facility treats wastewater to a tertiary level and disposes of it by three methods: 1) release to an adjacent turf farm, 2) pumping into a pressurized recycled water system that currently serves irrigation water to an adjacent landscape maintenance district and an industrial cooling system, and 3) release into the Suisun Marsh. Fairfield also has a rate structure that encourages recycled water use and has financial incentives in place to make the use of recycled water an option.

Other cities within the county dispose of treated wastewater into the Carquinez Strait (Benicia and Vallejo) or Cache Slough (Vacaville). Vacaville distributes some treated wastewater to the Solano Irrigation District and Maine Prairie Irrigation District and also offers it at no cost to construction firms to use for dust control. For additional details of other cities' wastewater collection and treatment systems, quantities treated, excess recycled water capacity not currently being distributed to non-potable customers, and type, place, and quantity of use, refer to the individual cities UWMPs.

## **Potential and Projected Use, Optimization Plan with Incentives**

*Provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area (10633).*

Within SCWA's service area a number of potential uses for recycled water have been identified, including increased landscape and agricultural irrigation, fire protection, industrial use (cooling towers at the Valero refinery), construction, wetlands and wildlife habitat, and other miscellaneous uses. Some of these are already in existence or, like the Valero refinery cooling towers, are in the planning stage. Other uses have not been implemented because the capital infrastructure, for example, treatment facilities and distribution systems, have not been built to accommodate such use. See individual city UWMP's for additional and more detailed information.

## **Future Water Supply Projects and Programs**

*(Describe) all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program (10631(h)).*

The February 2005 Solano Agencies' Integrated Regional Water Management Plan (IRWMP) identifies numerous water supply projects and programs to be considered for implementation. The direction in the IRWMP is to look at groundwater conjunctive use as a potential way of addressing dry year shortages. None of these conjunctive use projects have been developed enough to be classified as a "planned water supply project".

However, in 2009 SCWA received a Proposition 50 grant for a pilot conjunctive use well and a groundwater monitoring program that could lead towards a conjunctive use project. The test conjunctive use well was completed February 2011 and pilot testing will commence during the 2011 irrigation season. The test results will be analyzed for, 1) future groundwater pumping capacity, 2) potential interactions between groundwater and surface water delivery canals, 3) potential for changes in groundwater quality caused by groundwater pumping, and 4) capital, operations and maintenance costs for groundwater infrastructure.

## SECTION 4 – SYSTEM DEMANDS

*Quantify, to the extent records are available, past and current water use, and projected water use (over the same five-year increments described in subdivision (a)), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses: (A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; (I) Agricultural (10631(e)(1) and (2)).*

### Water Use by Customer Type

SCWA has three categories of customers: cities, agricultural districts and institutions.

SCWA delivers SWP water to the cities of Benicia, Vacaville, Fairfield, and Vallejo. SCWA has water contracts to deliver Solano Project water to the cities of Fairfield, Suisun City, Vacaville, and Vallejo. SCWA also has contracts with two agriculture water customers, the Solano Irrigation District and Maine Prairie Water District.

The institutions served by SCWA are the University of California at Davis (UCD) and the California State Prison – Solano (CSP-Solano). UCD receives an allocation of Solano Project Water which is used for agriculture on university property. Most of the water delivered to CSP-Solano, approximately 85%, is used mostly within the facility and the remaining 15% is used for agricultural purposes on some surrounding land.

Table 4 shows past, current and projected water deliveries in five year increments from year 2005 to 2030. Years 2005 and 2010 are based upon actual deliveries. Note that since SCWA is a wholesale supplier, customer cities have other supplies that they can use to meet their future demands. These will be shown in each of their individual UWMP's.

All SCWA water supplies are metered.

There are no water sales to any entities other than those listed in Table 4.

**Table 4. Past, Current and Projected Water Deliveries – All SCWA Supplies are Metered  
Units are in acre-feet.**

		Year	2005 (1)	2010 (1)	2015	2020	2025	2030
Name of Agency	Water Source	Water Distributed (Acre-Feet)						
Benicia	Solano Project	1,946	1,994	2,300	2,300	2,300	2,300	2,300
	SWP	12,585	8,231	8,500	8,500	8,500	8,500	8,500
	Total :	14,531	10,225	10,800	10,800	10,800	10,800	10,800
Cal State Prison -								
Solano	Solano Project	1,161	1,100	1,150	1,200	1,200	1,200	1,200
Fairfield	Solano Project	16,171	13,203	14,000	14,750	15,500	16,300	16,300
	SWP	8,416	7,989	8,500	9,000	9,500	10,000	10,000
	Total :	24,587	21,192	22,500	23,750	25,000	26,300	26,300
Maine Prairie Water District								
	Solano Project	6,367	10,318	10,300	10,300	10,300	10,300	10,300
Suisun City	Solano Project	5,044	4,041	4,900	5,100	5,300	5,400	5,400
Solano Irrigation District								
	Solano Project	106,247	114,031	125,500	130,000	130,000	130,000	130,000
University of California -								
Davis	Solano Project	1,965	1,145	1,200	1,200	1,200	1,200	1,200
Vacaville	Solano Project	4,570	3,971	4,500	4,750	5,000	5,250	5,250
	SWP	7,110	7,579	7,600	8,000	8,500	9,000	9,000
	Total :	11,680	11,550	12,100	12,750	13,500	14,250	14,250
Vallejo	Solano Project	12,430	14,672	14,600	14,600	14,600	14,600	14,600
	SWP	11,868	7,087	7,500	8,000	8,500	9,000	9,000
	Total :	24,298	21,759	22,100	22,600	23,100	23,600	23,600
<b>TOTAL :</b>		195,880	195,361	210,550	217,700	220,400	223,050	223,050

(1) Actual deliveries

Water supply projections that SCWA provided to each retail water supplier are shown as Appendix A and B.

Table 5 shows additional water uses and losses. The only category currently applicable to SCWA is “Unaccounted for System Losses” that are the losses associated with the Putah South Canal delivery of Solano Project water.

**Table 5. Additional Water Uses and Losses – AF/Year**

<b>Water Use</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>
Saline barriers						
Groundwater recharge						
Conjunctive use						
Raw Water						
Recycled						
Other (define)						
Unaccounted for system losses	13,960	15,000	15,000	15,000	15,000	15,000
<b>Total</b>	<b>13,960</b>	<b>15,000</b>	<b>15,000</b>	<b>15,000</b>	<b>15,000</b>	<b>15,000</b>

## **Water Use Reduction Plan**

*Urban wholesale water suppliers shall include in the urban water management plans . . . an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part (10608.36). Urban retail water suppliers are to prepare a plan for implementing the Water Conservation Bill of 2009 requirements and conduct a public meeting which includes consideration of economic impacts (CWC §10608.26).*

**Wholesale water suppliers are required to include in their UWMPs discussions of programs they intend to implement to support water demand reduction goals.**

SCWA fully supports the existing and planned efforts of its member agencies to comply with the provisions of SBx 7-7. SCWA has and will continue to provide financial and technical assistance to Solano County cities and irrigation districts to implement programs for both urban and agricultural water conservation. Funding for water use efficiency programs are an integral part of the water agency’s operating budget.

The Agency has taken the lead role in the coordination and implementation of regional water use efficiency measures for both residential and commercial accounts in Solano County. This is an ever evolving role designed to adapt to both political and environmental conditions. SCWA has been a member of the California Urban Water Conservation Council (CUWCC) since the organization was founded in 1991. Currently the agency serves as the Chair of the CUWCC Residential Committee.

Since 2007, SCWA has worked with its member agencies and implemented regional programs that offer financial incentives to Solano County residents to install High-Efficiency Toilets (HETs), High-Efficiency Washing Machines (HEWs), and to replace high water use turf with water-efficient landscaping. The Agency and its member units have also implemented a “Water Savings Incentive Program” designed to encourage Commercial, Institutional, and Industrial (CII) customers to install water

saving devices. In 2010 – 2011, Anheuser-Busch in Fairfield became the first participant in this program. City of Dixon will also use the Water Savings Incentive Program to replace damaged irrigation equipment at city parks.

## **SECTION 5 – WATER SUPPLY RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING**

### **State Water Project Supply**

Since the last round of Urban Water Management Plans (UWMPs) were prepared in 2005, the California Department of Water Resources (DWR) has twice updated its State Water Project (SWP) Delivery Reliability Report. In each of its updates, DWR has projected further reductions in average SWP water deliveries than were projected in 2005. The 2009 Report is the most recent update, and identifies several emerging factors that have the potential to affect the availability and reliability of SWP supplies. Although the 2009 Report presents an extremely conservative projection of SWP delivery reliability, particularly in light of events occurring since its release, it remains the best available information concerning the SWP.

In order to categorize the water year type into dry and normal years, the Sacramento Valley Index (SVI). The Sacramento Valley Index uses 40% of April through July runoff, 30% of October through March runoff and 30% of the previous year's index. The Sacramento Valley Index is used to determine water year types in State Water Resources Control Board Decision 1641 (D-1641).

Based on the 2009 State Water Project Delivery Reliability Report, the driest single year for SCWA would be 1977. A multiple dry year scenario would be based on the five year period from 1987 – 1992.

Note that the SWP also makes available Article 21 water that is offered to SWP contractors under specified conditions when the Delta is in excess conditions and there is pumping capacity available. SCWA receives its water from the North Bay Aqueduct (NBA). Current DWR policy is that Article 21 water is available for the NBA whenever the Delta is in Excess conditions. This makes Article 21 water available to NBA users more frequently than SWP contractors relying upon the Banks Pumping Plant (South Delta SWP export facility) capacity. For the purposes of this UWMP, Article 21 deliveries are not included although they can be a significant additional supply most years.

There are numerous factors that affect the reliability of SWP supplies. The amount of the SWP water supply delivered to the state water contractors in a given year depends on the demand for the supply, amount of rainfall, snowpack, runoff, water in storage, pumping capacity from the Delta, and legal constraints on SWP operation. SWP delivery reliability depends on three general factors: 1) the availability of water at the source, 2) the ability to convey water from the source to the desired point of delivery, and 3) the magnitude of demand for the water.

Another factor affecting SWP reliability is climate change. Climate change is expected to modify rainfall

and runoff, which in turn will affect SWP operations. Some research suggests that global changes in climate is likely to significantly affect the hydrologic cycle, changing California's precipitation pattern and amount from that shown by the historical record.

SWP operations are closely regulated by Delta water quality standards established by the State Water Resources Control Board (SWRCB) in D-1641. In addition SWP and CVP operations are further constrained by requirements in the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) biological opinions. Key factors in determining water quality in the western Delta are the quality of important Delta inflows and the intrusion of ocean-derived salts associated with daily tides. The models used to develop the SWP reliability data incorporate these constraints.

SWP supply is not always available at a consistent level due to these environmental and political factors. Plans to replace or supplement the SWP source when there are shortages are the responsibility of SCWA member agencies that contract for SWP supplies. They would typically shift to other supplies such as Solano Project and groundwater (if they have rights to these supplies) or enter into purchase or exchange agreements with other Solano agencies. SCWA would also keep member agencies informed about any SWP collective programs for dry year water purchases, such as a drought water bank. SCWA would also coordinate any joint local efforts to secure short term water supplies under a drought conditions. Increased demand management measures would be the responsibility of the member agencies to implement.

SCWA has filed litigation against DWR asserting that, under Article 18 of the SCWA – SWP water supply contract, the Water Agency, as a SWP Contractor in the Area of Origin, should not be allocated SWP supply shortages. Until that litigation is resolved, this UWMP shows the same shortages as applied to all SWP Contractors.

## **Solano Project Supply**

For the Solano Project a similar year type index was developed based upon procedures similar to the Sacramento Valley Index. A current model exists for the Solano Project that uses hydrologic records from 1906 through 2007. Using similar assumptions as the Sacramento Valley 40/30/30 Index, year types were assigned to each of the years in the Solano Project model resulting in a Lake Berryessa Index that identifies wet, normal and dry years. Results from a SCWA funded study regarding Solano Project reliability indicate the single driest year for this water source would be based on the 1934 hydrologic year. The multiple dry year period was from 1990 – 1994.

The allocation process for water supplies from the Solano Project is very different than for the SWP. For the Solano Project, the contract between SCWA and USBR calls for the full contract amount to be delivered to SCWA unless it is physically impossible to deliver the water from Solano Project storage (dead storage is 10,300 AF). Therefore, the full contract water supply, 207,350 acre feet per year, is allocated until there is no water available in the reservoir. All Solano Project contractors, whether they are municipal or agricultural, are on an equal basis for Solano Project water supply.

Appendix A shows the results of assigning a water year type to each of the years in the Solano Project study. The results are summarized in Table 6.

The Solano Project member agencies (cities and districts that contract with SCWA for Solano Project water supply) have entered into an Agreement As To Drought Measures and Water Allocation contract to reduce deliveries based upon storage levels in Lake Berryessa. Once the storage level drops below 800,000 acre feet, as measured on April 1, 95% of contract amounts are delivered with 5% being stored in the reservoir as carryover. If the reservoir drops below 550,000 acre feet by April 1, 90% can be delivered and 10% is stored as carryover. Member agencies have the ability to carryover more than this amount if they desire. Once the reservoir level is below 400,000 acre feet on April 1, the member agencies can use their full allocation and any stored carryover. All the Solano Project cities are parties to this agreement.

The main factor negatively affecting Solano Project reliability is the frequency of long droughts which could result in major drawdowns of Lake Berryessa. Environmental issues have been addressed in a legal settlement regarding downstream flows from the Solano Project and the settlement has been ratified by the State Water Resources Control Board. Limits on upstream depletions have been established through a settlement agreement administered by a court appointed Watermaster.

**Table 6. Supply Reliability - Percent Allocation**

	Normal Water Year	Single Dry Water Year	Multiple Dry Water Years
State Water Project (2010)	64%	63%	33%
State Water Project (2029)	64%	46%	31%
Solano Project (current)	99%	98%	89%
Solano Project (ultimate)	99%	98%	89%

### Projected Normal Water Year Supply and Demand

*Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following: (A) an average water year, (B) a single dry water year, (C) multiple dry water years (10631(c)(1)). Average Year — a year or an averaged range of years in the historical sequence that most closely represents median runoff levels and patterns. It is defined as the median runoff over the previous 30 years or more. This median is recalculated every 10 years. Single-dry year — generally considered to be the lowest annual runoff for a watershed since the water-year beginning in 1903. Suppliers should determine this for each watershed from which they receive supplies. Multiple-dry year period — generally considered to be the lowest average runoff for a consecutive multiple year period (three years or more) for a watershed since 1903. For example, 1928-1934 and 1987-1992 were the two multi-year periods of lowest average runoff during the 20th century in the Central Valley basin. Suppliers should determine this for each watershed from which they receive supplies.*

This section presents a separate analysis of the SWP and Solano Project water supplies. Separate analysis is necessary because member agencies of SCWA do not all have both water supplies, so they will need a separate analysis in order to prepare their UWMP's.

## State Water Project

Table 7 shows normal year water supply and demand for SWP supplies. The supply number was calculated by multiplying the percentage of SWP supply for a normal year by SCWA's SWP contract amount. The SWP supply for a normal year was defined as the average of percentage supplies for all the below normal and above normal years in the Sacramento Valley Index from 1922 through 2003.

In August 2010, DWR released the final 2009 SWP Delivery Reliability Report (2009 Reliability Report). This version of the biennially-issued report included quantification of the impacts of biological opinions for species in the Delta (e.g., Salmon) issued in 2008 and new studies completed on climate change. The 2009 Reliability Report indicated that the long-term average yield from the SWP is 60% of SCWA's Table A amount, or approximately 28,654 AFA, and the median yield is 30,564 AFA or approximately 64%; note however, that the biological opinions are being revised per recent Federal Court rulings issued in spring and fall 2010.

**Table 7. Projected SWP Normal Year Supply and Demand Comparison - AF/Y**

	2010 (1)	2015	2020	2025	2030
Supply (2)	30,386	30,564	30,564	30,564	30,564
Demand (3)	30,386	47,756	47,756	47,756	47,756
Difference (supply minus demand)	0	-17,192	-17,192	-17,192	-17,192
Difference as % of Supply	0%	-56%	-56%	-56%	-56%
Difference as % of Demand	0%	-36%	-36%	-36%	-36%

1) Actual deliveries

2) Assumes normal supply is 64% of SWP contract amount.

Does not include Settlement, Carryover, or Article 21 water. Also does not include Vallejo Permit Water.

3) Assumes demand is equal to full contract amount by each city

For Table 7 demand was assumed to be the full SWP contract amounts. For a wholesale agency like SCWA, it is not possible to accurately predict the demand of our cumulative member agencies. Therefore, a simplifying assumption that they would utilize the full amount of their contractual rights was assumed. There is a deficit since the supply was assumed to be 64% of contract amounts while demand was assumed to be the full contracted amount by each city.

Individual cities, such as Benicia, Fairfield, and Vacaville also have access to Settlement Water. Vallejo holds an Appropriative Water Rights License No. 7848 with the State Water Resources Control Board, issued August 1966 that is commonly referred to as Vallejo Permit Water (VPW). Conveyance of VPW is limited by contract to a maximum of 17,287 AF per year. Since the limitation is not based on a physical capacity constraint of the NBA, an additional 5,493 AF could be available upon execution of an amendment to the existing agreement between DWR and SCWA.

In Table 8, the supply number was calculated by multiplying the percentage of SWP supply for a single dry year by the SCWA's SWP contract amount. The SWP supply for a single dry year was defined as the average of percentage supplies for all single dry and critical years in the Sacramento Valley Index from 1922 through 2003. Single dry years are defined as those dry and critical years that are not consecutive plus the first dry or critical year of consecutive sequences. Using DWR's final 2009 SWP Delivery Reliability Report (2009 Reliability Report) the average is 63% of supply. This 63% allocation was applied to SCWA SWP contract amounts to determine the single dry year supply figures from 2015 to 2025. For 2030, 46% was used.

For Table 8 demand was assumed to be the full SWP contract amounts. For a wholesale agency like SCWA, it is not possible to accurately predict the demand of our cumulative member agencies. Therefore, a simplifying assumption that they would utilize the full amount of their contractual rights was made.

Table 8 shows single dry year supply and demand comparisons. There is a deficit since the supply was assumed to be 63% of contract amounts and contract amounts we assumed to be the demand.

**Table 8. Projected SWP Single Dry Year Supply and Demand Comparison - AF/Y**

	2010 (1)	2015	2020	2025	2030
Supply totals	30,386	30,086	30,086	30,086	30,564
Demand totals	30,386	47,756	47,756	47,756	47,756
Difference (supply minus demand)	0	-17,670	-17,670	-17,670	-17,192
Difference as % of Supply	0%	59%	59%	59%	-56%
Difference as % of Demand	0%	37%	37%	37%	-36%

1. Actual amounts.
2. Assumes single dry year supply is 63% of SWP contract for 2015 through 2025 and 64% for 2030..
3. Assumes demand is equal to contract amounts.

Multiple dry year water supply and demand for SWP supplies from 2015-2019 is shown in Table 8. The supply number was calculated by multiplying the percentage of SWP supply for multiple dry years by

SCWA's SWP contract amount. The SWP supply for multiple dry years was defined as the average of percentage supplies for all dry and critical years occurring in three or more consecutive years in the Sacramento Valley Index from 1922 through 2003 as shown in Table 6. See Appendix B for the analysis.

For Table 9 demand was assumed to be the full SWP contract amounts. For a wholesale agency like SCWA, it is not possible to accurately predict the demand of our cumulative member agencies. Therefore, a simplifying assumption that they would utilize the full amount of their contractual rights was assumed.

**Table 9. Projected SWP Supply and Demand Comparison During a Multiple Dry Year Period Ending in 2019 - AF/Y**

	2015	2016	2017	2018	2019
Supply totals	15,760	15,760	15,760	15,760	15,760
Demand totals	47,756	47,756	47,756	47,756	47,756
Difference (supply minus demand)	-27,911	-27,940	-27,970	-27,999	-28,029
Difference as % of Supply	144%	144%	144%	144%	144%
Difference as % of Demand	59%	59%	59%	59%	59%

1. Assumes multiple dry year supply is 33% of SWP contract amount.

2. Assumes demand is equal to contract amounts.

## Solano Project

A normal year water supply and demand for Solano Project supplies is depicted in Table 10. The supply number was calculated by multiplying the percentage of Solano Project supply for a normal year by the Solano Project contract amount. The Solano Project supply for a normal year was defined as the average of percentage supplies for all the below normal and above normal years in the Lake Berryessa Index from 1906 through 2007. The ultimate level of upstream development (for depletions in the upstream watershed) was used for these tables, not the current level of development. A normal year is a supply of 206,240 AF or 99% of contract amounts as shown in Table 10.

**Table 10. Projected Solano Project Normal Year Supply and Demand Comparison - AF/Y**

	2010	2015	2020	2025	2030
Supply Totals	205,277	205,277	205,277	205,277	205,277
Demand Totals	207,350	207,350	207,350	207,350	207,350
Difference (supply minus demand)	-2,073	-2,073	-2,073	-2,073	-2,073
Difference as % of Supply	-1.0%	-1.0%	-1.0%	-1.0%	-1.0%
Difference as % of Demand	-1.0%	-1.0%	-1.0%	-1.0%	-1.0%

1. Assumes normal year supply is 99% of Solano Project contract amount.

2. Assumes demand is equal to contract amounts.

For Table 10 demand was assumed to be the full Solano Project contract amounts. For a wholesale agency like SCWA, it is not possible to accurately predict the demand of our cumulative member agencies. Therefore, a simplifying assumption that they would utilize the full amount of their contractual rights was made. Table 9 shows normal year supply and demand comparisons. There is a deficit since the supply was assumed to be 99% of the Solano Project contract amount and demand was assumed to be the full contract amount.

Table 11 shows a single dry year water supply and demand projection for Solano Project supplies. The supply number was calculated by multiplying the percentage of Solano Project supply for a single dry year by the Solano Project contract amount. The Solano Project supply for a single dry year was defined as the average of percentage supplies for all single dry and critical years below normal and above normal years in the Lake Berryessa Index from 1906 through 2007. Single dry years are defined as those dry and critical years that are not consecutive plus the first dry or critical year of consecutive sequences. The ultimate level of upstream development (for depletions in the upstream watershed) was used for these tables, not the current level of development. A single dry year is a supply of 203,203 AF or 98% of contract amount as shown in Table 11.

**Table 11. Projected Solano Project Single Dry Year Supply and Demand Comparison – AF/Y**

	2010	2015	2020	2025	2030
Supply Totals	203,203	203,203	203,203	203,203	203,203
Demand Totals	207,350	207,350	207,350	207,350	207,350
Difference (supply minus demand)	-4,147	-4,147	-4,147	-4,147	-4,147
Difference as % of Supply	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%
Difference as % of Demand	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%

1. Assumes single dry year supply is 98% of Solano Project contract amount.

2. Projected normal is 99% of contract amount.

3. Assumes demand is equal to contract amounts.

For Table 11 demand was assumed to be the full Solano Project contract amounts. For a wholesale agency like SCWA, it is not possible to accurately predict the demand of our cumulative member agencies. Therefore, a simplifying assumption that they would utilize the full amount of their contractual rights was assumed. There is a deficit since the supply was assumed to be 99% of the Solano Project contract amount and demand was assumed to be the full contract amount.

Table 12 shows multiple dry years water supply and demand for Solano Project supplies. The supply number was calculated by multiplying the percentage of Solano Project supply for multiple dry years by the Solano Project contract amount. The Solano Project supply for multiple dry years was defined as the average of percentage supplies for all dry and critical years occurring in three or more consecutive years in the Lake Berryessa Index from 1906 through 2007. The ultimate level of upstream development (for depletions in the upstream watershed) was used for these tables, not the current level of development. See Appendix A for the analysis. The multiple dry years supply is 184,542 AF or 89% of contract amounts as shown in Table 12.

**Table 12. Projected Solano Project Supply and Demand Comparison During Multiple Dry Year Period Ending in 2019 – AF/Y**

	2015	2016	2017	2018	2019
Supply totals	184,542	184,542	184,542	184,542	184,542
Demand totals	207,350	207,350	207,350	207,350	207,350
Difference (supply minus demand)	-19,172	-19,172	-19,172	-19,172	-19,172
Difference as % of Supply	10.0%	10.0%	10.0%	10.0%	10.0%
Difference as % of Demand	9.0%	9.0%	9.0%	9.0%	9.0%

1. Assumes single dry year supply is 89% of Solano Project contract amount.
2. Assumes demand is equal to contract amounts.

For Table 12 demand was assumed to be the full Solano Project contract amounts. For a wholesale agency like SCWA, it is not possible to accurately predict the demand of our cumulative member agencies. Therefore, a simplifying assumption that they would utilize the full amount of their contractual rights was assumed. There is a deficit since the supply was assumed to be 89% of contract amounts and contract amounts we assumed to be the demand.

# WATER SHORTAGE CONTINGENCY PLAN

## Stages of Action

*Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster (10632(c)).*

SCWA is strictly a wholesale supplier of water, not a water utility. It is the responsibility of each of the cities within Solano County to deal with water shortages. SCWA provides coordination assistance but is not responsible for making any decisions regarding water shortages. The only exception is that SCWA retains authority to change allocations of SWP supplies water during shortages.

The contract language is as follows: “If at any time there occurs a shortage from any cause in the quantity of project water made available to Agency so that the total quantity made available to Agency is less than the total of all quantities of project water contracted for by this member unit and other member units, Agency shall portion the project water available among all member units in such a manner as Agency shall determine to be equitable. In making such determination, Agency shall consult with all its member units as shall be guided by, but not limited to, consideration of the following factors with respect to each member unit: other supplies of water available to the member unit; the quantities of water normally used by the member unit for domestic, municipal, industrial, commercial, and other purposes, and the relative ability of the member unit to reduce the quantity of water it uses; and impact various reductions of water supply will have on the economy, public health, and welfare.”

Although there are frequent shortages in the SWP supply, SCWA has never used its authority to allocate SWP supplies during any shortages. SCWA has delivered supplies in proportion to contract amounts.

A two-stage trigger for contingency actions is shown in Table 13. Stage 1 is if there is a 25% reduction in either SWP and/or Solano Project supplies. During Stage 1 conditions, SCWA will offer to assist member agencies in any internal exchanges or transfers and also assist in securing additional water supplies from outside sources such as drought water banks or joint efforts with other water agencies to obtain supplies in dry years.

**Table 13. Water Supply Shortage Stages and Conditions**

Stage No.	Water Supply Conditions	% Shortage
1	Reduction in SWP and/or Solano Project	25%
2	Reduction in SWP and/or Solano Project	50%

Stage 2 is invoked if there is a 50% reduction in SWP and/or Solano Project supplies. During Stage 2 conditions SCWA will perform the same functions in Stage 1 and will also state its willingness to consider allocations of shortages in the SWP supply as specified in the member agency agreements.

## Estimate of Minimum Supply For Next Three Years

*An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply (10632(b)).*

SCWA has two water supply sources: the SWP and the Solano Project. These two projects have different historic dry year sequences. The three worst years for the SWP supply are 1990-1993 (See Appendix B). The three worst years for the Solano Project supply are 1932-1934 (See Appendix A). These are reflected in Table 13. Note that the use of different dry year sequences in Table 14 results in a very conservative depiction of the estimated minimum supply for the next three years as it is unlikely that extreme dry period for both the Solano Project and SWP will coincide, especially since reductions in the Solano Project is based on reservoir levels while reductions in SWP supplies are based on current year hydrologic conditions.

**Table 14. Three-Year Estimated Minimum Water Supply – AF/Year worst separate 3 year series**

<b>Source</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Normal</b>
State Water Project*	20,000	9,800	16,590	30,560
Solano Project	207,350	93,300	93,300	205,280
<b>Total</b>	<b>227,350</b>	<b>103,100</b>	<b>109,850</b>	<b>235,840</b>

**\*does not include Article 21 Water**

Note that Table 14 does not include Article 21 water that could supplement SWP supplies. As mentioned previously, the NBA contractors have access to Article 21 water on a more frequent basis than those SWP contractors relying upon the SWP Banks pumping plant.

## **Catastrophic Supply Interruption Plan**

The following discusses actions that would take place if there is a catastrophic event on either the SWP or Solano Project supplies.

### **Solano Project**

**Earthquake:** in the event of an earthquake, the Solano Project Emergency Response Plan is invoked. The Plan, developed in coordination with the USBR, provides a detailed response for various levels of seismic activities both at the dam site and within a specified geographical area surrounding the Solano Project. The response is first an inspection then an assessment of any potential damage. If water deliveries are unavailable from the Solano Project, water users would shift to SWP supplies and/or invoking emergency exchange agreements with other public agencies.

**Power Outage:** The Solano Project is not dependent upon power to operate. It is a gravity system from Monticello Dam to the end of the Putah South Canal and can be operated manually.

**Contamination:** Any detection of contamination would result in a shut-down of the Solano Project deliveries. Member agencies would switch to the SWP supply.

**Landslide:** The Putah South Canal is susceptible to a landslide which could either block or damage the Canal's ability to deliver water. SCWA recently invested in a \$3 million project to provide an underground pipeline bypass of an area most susceptible to a landslide. However, in an event of a

landslide that blocks the Putah South Canal, Solano Project city water users would shift to a SWP supply. The SWP supply would not be available to agricultural water users.

### **State Water Project**

**Earthquake:** Should an earthquake result in a disruption of SWP supplies through the NBA, the member agencies would switch to Solano Project Water supplies. All the NBA water users have access to Solano Project supplies in such an emergency.

**Power Outage:** The NBA relies upon PG&E to provide power to pump water through the NBA. Any power outage of any duration would result in the NBA not being able to provide its water supply except for the amount of water in storage in the pipeline, that is very limited. The NBA water users would shift to Solano Project supplies in this scenario.

**Contamination:** Should there be a contamination at the intake to the NBA, the NBA would be shut-down and the member agencies would use Solano Project water until the contamination is resolved.

**Landslide:** The NBA is an underground pipeline and therefore would not be subject to any landslide risks.

### **Prohibitions, Penalties and Consumption Reduction Methods**

SCWA is purely a water wholesaler and does not implement any of the actions contemplated in this subsection. SCWA is contractually committed to provide the available water supply from the SWP and the Solano Project to its member agencies regardless of hydrologic conditions (with the exception of having the authority to allocate NBA water supplies in a manner different than contractual amounts during a water shortage). SCWA does not have the ability to take measures to provide incentives or disincentives for water use from SCWA.

## **Analysis of Revenue Impacts of Reduced Sales During Shortages**

### **Solano Project**

SCWA has paid off the capital debt to USBR for the Solano Project. As a result the Agency is not charged by Reclamation for the Solano Project water supply. Therefore, SCWA does not charge Solano Project member agencies for Solano Project water supply. There would be no net impact to SCWA revenues during a water shortage.

### **State Water Project**

The contract between SCWA and its SWP member agencies require full payment of water supply costs regardless of shortages. Therefore, there would be no financial impact to SCWA from shortages.

## **Draft Ordinance and Use Monitoring Procedure**

### **Solano Project**

The Solano Project contract with member agencies requires the full amount allocated by the USBR be provided to the member agencies. The contract between SCWA and the USBR requires allocation of the full amount of contract amounts unless that water is physically unable to be delivered from the Solano Project.

The Solano Project Members Agreement As To Drought Measures and Water Allocation provides for a reduction in the use of Solano Project water when reservoir levels are between 800,000 acre feet of storage (approximately half full) and 450,000 acre feet of storage. The Agreement requires a reduction of five to ten percent of Solano Project use during this storage level. The five to ten percent not utilized is stored in the reservoir as carryover to be made available when the storage is above 800,000 acre feet or below 450,000 acre feet.

## **State Water Project**

SCWA does have the ability to allocate SWP water to member agencies during a shortage but has not invoked this provision to date. SCWA has determined that it will consider invoking this provision at the request of a member agency on a case by case basis. No predetermined shortage allocations have been determined.

## **WATER QUALITY IMPACTS ON RELIABILITY**

### **State Water Project**

SWP water from the NBA is of lesser quality than the Solano Project. The NBA has historically been plagued with a variety of water quality issues. Throughout the winter and early spring months the NBA experiences very high concentrations of Dissolved Organic Carbon and high turbidity. Additionally, during local storm events the NBA water quality can change dramatically over the course of a few hours, and remain poor for weeks to months at a time. More recently, the NBA has encountered Taste & Odor issues from blue-green algae during the winter months, further impacting water quality.

SCWA has implemented land use Best Management Practices (BMPs) in the local watershed to reduce organic carbon and turbidity loading. Wells, additional irrigation piping and fencing have been installed to protect the upper watershed and control livestock.

The Agency has recently completed a feasibility study to determine if an alternate intake for the NBA can be constructed. An alternate intake would provide higher reliability water by virtue of being in a location that is less susceptible to impacts caused by local runoff. It would also draw water from an area that is not a spawning area for rare or endangered fish species. The study results indicated that the project is feasible, but at a cost of \$315 - \$436 million, depending on the location chosen for the intake.

### **Solano Project**

Solano Project water quality is excellent for both agricultural and urban uses. During large storms there is a short period (a few days) when water is very turbid, and Solano Project diversions from Lake Solano are temporarily halted. This conditions occurs during low demand periods.

## Section 6: Demand Management Measures

*(Describe and provide a schedule of implementation for) each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following: (A) water survey programs for single-family residential and multifamily residential customers; (B) residential plumbing retrofit; (C) system water audits, leak detection, and repair; (D) metering with commodity rates for all new connections and retrofit of existing connections; (E) large landscape conservation programs and incentives; (F) high-efficiency washing machine rebate programs; (G) public information programs; (H) school education programs; (I) conservation programs for commercial, industrial, and institutional accounts; (J) wholesale agency programs; (K) conservation pricing; (L) water conservation coordinator; (M) water waste prohibition; (N) residential ultra-low-flush toilet replacement programs (10631(f)(1) and (2)).*

SCWA views water conservation/demand management as a critical element of any water resources strategy developed for Solano County. As indicated earlier in the Plan, in 1991 the Agency became one of the first signatories to the Memorandum of Understanding Regarding Urban Water Conservation In California (MOU) and became a member of the CUWCC. SCWA has been an active member of the CUWCC since for 20 years. Currently the Agency is also serving as Chair of the CUWCC Residential Committee.

Demand Management Measures (DMMs) are specific actions a water supplier takes to support its water conservation efforts. Specifically, the UWMP Act identifies 14 DMMs (CWC 10631(f)) that are to be evaluated in each UWMP. The 14 DMMs are:

- A. Water survey programs for single-family residential and multifamily residential customers
- B. Residential plumbing retrofit
- C. System water audits, leak detection, and repair
- D. Metering with commodity rates for all new connections and retrofit of existing connections
- E. Large landscape conservation programs and incentives
- F. High-efficiency washing machine rebate programs
- G. Public information programs
- H. School education programs
- I. Conservation programs for commercial, industrial, and institutional accounts
- J. Wholesale agency programs
- K. Conservation pricing
- L. Water conservation coordinator
- M. Water waste prohibition
- N. Residential ultra-low-flush toilet replacement programs

These 14 DMMs correspond to the 14 BMPs listed and described in the CUWCC MOU that signatory water suppliers commit to implement as part of their urban water conservation programs. These 14 DMMs also correspond to the DMMs identified in DMM Implementation Compliance (AB 1420). DWR has consulted with the CUWCC and appropriate funding agencies and determined that DMMs will be equated with the BMPs as described in the CUWCC MOU for loan and grant funding eligibility purposes. Therefore, for the UWMP process, DMMs, and BMPs are referred to interchangeably as DMMs/BMPs.

DWR requires wholesale urban water suppliers to address DMMs C, System water audits, leak detection, and repair, D, Metering with commodity rates for all new connections and retrofit of existing

connections, J, Wholesale agency programs, K, Conservation pricing, and L, Water conservation coordinator.

## **DMM Description**

### **A. Water survey programs for single-family residential and multifamily residential customers**

This DMM is not directly applicable to SCWA. However, SCWA implements a regional residential water survey program in conjunction with its member units. Since each city would have to implement a water survey program, it was decided that conducting a regional county-wide program would be more cost-effective. This program covers the entire county and is aimed at assisting homeowners to achieve water savings and lower water bills.

In 2009, SCWA began the Residential Water Assistance Program to assist residents to identify indoor and outdoor leaks that contribute to inefficient water use. The Residential Water Assistance Program includes both an indoor and an outdoor component. The indoor portion examines possible sources of leaks; teaches the customer how to read the meter and calculate water use; and offers suggestions to improve water efficiency. The outdoor landscape survey includes a check of the irrigation system and timers for maintenance and repairs needed; estimate or measure landscaped area; develop customer irrigation schedule based on precipitation rate, local climate, irrigation system performance, and landscape conditions; review the scheduling with customer; provide information packet to customer; and provide customer with evaluation results and water savings recommendations.

This program is patterned on the successful residential water survey program implemented by the City of Fairfield, which has conducted over 3,000 residential water surveys. Additionally, City of Fairfield provides training and office space for staff involved in this program. This is a regional program that SCWA administers in coordination with its member units. The Agency and its member units also cost share on this program.

### **B. Residential plumbing retrofit**

This DMM is incorporated into the Residential Water Assistance Program. Watersense specified showerheads and faucet aerators are distributed as needed as part of the program.

### **C. System water audits, leak detection, and repair**

SCWA is responsible for maintaining the Putah South Canal (PSC) of the Solano Project. The PSC is a 33 mile concrete lined channel. PSC losses are calculated by taking measured flows (measured by Parshell flume) at the PSC headworks and subtracting deliveries. SCWA has developed a multi-year program to better quantify whether losses are from leakage, accounting errors or measurement errors – or a combination of both. Several major leaks were identified by taking in canal flow measurements and were repaired in 2002. Other areas in the PSC were checked, but no other such major leaks were identified. In 2003 rating curves for weirs delivering PSC to large agricultural turnouts were recalibrated after it was discovered that the rating curves were not accurate. There is an on-going program to install improved water measurement devices in the PSC to provide a more accurate mass balance of water.

The other conveyance facility serving SCWA, the North Bay Aqueduct (NBA) is an underground pipeline (22 miles) operated and maintained by the California Department of Water Resources. DWR reports that there are no significant losses from the NBA.

In the Fiscal Year 2011/12, SCWA will begin implementation of a regional leak detection/meter calibration program. The program will be aimed at finding sources of real and apparent water loss.

#### **D. Metering with commodity rates for all new connections and retrofit of existing connections**

All SCWA water sales are metered – there are no unmetered connections. The DMM also requires the identification of intra- and inter-agency disincentives or barriers to retrofitting mixed use commercial accounts with dedicated landscape meters and conducting a feasibility study to assess the merits of a program to provide incentives to switch mixed use accounts to dedicated landscape meters. This portion of the DMM is more appropriately implemented out by the member units.

#### **E. Large landscape conservation programs and incentives.**

This DMM is not applicable since SCWA does not directly serve any large landscape customers. However, just as is the case with the other non-applicable DMMs, SCWA will support the member units' efforts to implement this DMM.

#### **F. High-efficiency washing machine rebate program**

SCWA implements a regional High-Efficiency Washing Machine (HEW) rebate program that covers all of Solano County. This program offers a rebate of \$125 for the installation of a Tier 3 HEW. Tier 3 HEWs are the most water-efficient and are defined as having a Water Factor of 4.0 or less. The Water Factor is a ratio of the volume of a washing machine to the amount of water used, basically it is a measure of washing machine effectiveness, the lower the Water Factor, the more efficient the machine.

See individual cities UWMPs for a more detailed description of the DMM.

#### **G. Public information programs**

SCWA maintains a website, <http://Solanosaveswater.org> to provide water conservation information and news. However, most of the public information programs in Solano County are conducted by the cities.

#### **H. School programs**

SCWA funds a number of school water education programs. Among them is WaterWays, an outdoor education program for upper elementary school students designed to build understanding, appreciation, and stewardship of a local waterway by exploring the diverse uses of the water and how these uses may be protected.

The Agency also funds two non-traditional school assembly programs, ZunZun and Rock Steady Juggling. ZunZun is a performing arts group that uses music to teach students about water and environmental stewardship. Rock Steady Juggling also uses performing arts to teach students the value of

water. Both methods use a fun approach to keep students engaged and more receptive to receiving the message about water.

### **I. Conservation programs for commercial, industrial, and institutional accounts**

In 2006, SCWA funded a study to outline a Commercial, Industrial, and Institutional (CII) water use efficiency program design for the county. The study recommended a program incorporating these five steps.

Step 1. Develop & Implement Marketing Plan

Step 2. Identify the Target Program Participants

Step 3. Conduct the Site Surveys

Step 4. Set up an incentive program to run at the same time the audit program is active.

Step 5. Track Program Successes & Challenges in Computer Database

SCWA began implementation in January 2007. This program offers CII accounts a free water audit to determine the efficiency of their existing system. Eligible customers can participate in a “Water Savings Incentive Program” designed to assist schools and parks replace high- water use devices with water-efficient ones. The Incentive Program will also be directed to commercial accounts. In 2010 SCWA and the City of Fairfield joined in a partnership with Anheuser-Busch to assist in their water efficiency efforts.

The CII water conservation program is regional and extends throughout Solano County. This is a joint venture between SCWA and its member units. Additional detail regarding the CII water conservation program can be found in individual cities’ UWMPs.

### **J. Wholesale agency programs**

SCWA, as a wholesaler, provides financial and technical support as well as program management to its member agencies. Financially, SCWA will pay 75% of the cost for a water conservation program and the cities will divide the remaining 25%. Additionally, to the extent possible, SCWA as a wholesale water agency provides reports on BMP implementation within the service area by retail water agencies that are not signatories to the MOU.

SCWA has implemented several regional conservation programs. Many programs would not be cost effective for only one city to implement but the costs become less if factored in on a county-wide basis.

Currently there are regional water conservation programs directed at both residential and commercial accounts. SCWA offers rebates to homeowners for High-Efficiency Toilet (HET) and High-Efficiency Washer (HEW) installation. A pilot turf replacement program that offered financial incentives to homeowners to replace turf with water-efficient landscaping was implemented during 2010 and will be offered again in 2011. There is also a rebate program to encourage the installation of “smart” irrigation controllers (controllers that automatically adjust to changing weather conditions).

As mentioned earlier, the Agency also manages a county-wide water conservation program directed to CII accounts. Water surveys, designed to find leaks or water wasting practices, are offered at no cost to CII customers. Additionally SCWA offers commercial accounts the “Water Savings Incentive Program” in which SCWA will reimburse a business or other CII account as much as 50% of the costs for installing

water efficient devices. Eligible accounts also have the option of replacing older, high-water use toilets with HETs.

Additionally, SCWA and its member units run a regional residential water survey program designed to assist homeowners save money by becoming more water efficient.

#### **K. Conservation pricing**

SCWA is contractually obligated to charge a fixed rate for water from the State Water Project. In regards to the SWP, contracts between SCWA and cities that use SWP water call for a price of \$20.50 per acre-foot.

#### **L. Water conservation coordinator**

SCWA has a Water Conservation Coordinator. The Water Conservation Coordinator is responsible for the Agency's water use efficiency program planning, budgeting, implementation, and evaluation, and for coordinating those efforts with the member units. The Coordinator also serves as the Chair for the Residential Committees in the CUWCC and as the coordinator for the Solano County Urban Water Conservation Committee.

SCWA Water Conservation Coordinator

Name: Andrew Florendo/Senior Water Resource Specialist

e-mail: [aflorendo@scwa2.com](mailto:aflorendo@scwa2.com)

telephone: 707.455.1111

#### **M. Water waste prohibition**

Not directly applicable to SCWA but the Agency will support the DMM to the extent practical. Again, this DMM is more appropriately carried out by the retail agencies (see individual UWMPs submitted for the retail urban water suppliers).

#### **N. Residential ultra-low-flush toilet replacement programs**

SCWA does not offer rebates or other incentives for the installation of ultra-low flush toilets (ULFTs). However the Agency, in conjunction with its member units offers both a rebate and direct install program for the installation of HETs (which use 20% less water than ULFTs). Again, see the individual city UWMPs for more details about the Solano HET installation program.

## Appendix A Solano Project Reliability

**Ultimate** level of development-of Lake Berryessa watershed @ 30,000 AF/yr - 2009 Study

Lake Berryessa Index

Value	Year Type
W	Wet
N	Below Normal
N	Above Normal
D	Dry
D	Critically Dry

Year	Index Value	% Full Alloc	% Full Alloc for Normal Year (N)	% Full Alloc for Single Dry Year (D) *	% Full Alloc for Multiple Dry Years (3 or more Dry years)
1906	W	100%			
1907	W	100%			
1908	D	100%		100%	
1909	W	100%			
1910	N	100%	100%		
1911	W	100%			
1912	D	100%		100%	
1913	D	100%			
1914	W	100%			
1915	W	100%			
1916	W	100%			
1917	N	100%	100%		
1918	D	100%		100%	
1919	N	100%	100%		
1920	D	100%		100%	
1921	N	100%	100%		
1922	N	100%	100%		
1923	N	100%	100%		
1924	D	95%		95%	
1925	N	95%	95%		
1926	N	95%	95%		
1927	W	95%			
1928	N	100%	100%		
1929	D	95%		95%	
1930	N	95%	95%		
1931	D	100%		100%	100%
1932	D	100%			100%
1933	D	45%			45%
1934	D	45%			45%
1935	N	100%	100%		
1936	N	100%	100%		
1937	N	100%	100%		
1938	W	100%			
1939	D	95%		95%	

1940	W	100%			
1941	W	100%			
1942	W	100%			
1943	N	100%	100%		
1944	D	100%		100%	
1945	N	100%	100%		
1946	N	100%	100%		
1947	D	100%		100%	100%
1948	D	95%			95%
1949	D	95%			95%
1950	D	95%			95%
1951	N	95%	95%		
1952	W	100%			
1953	N	100%	100%		
1954	N	100%	100%		
1955	D	95%		95%	
1956	W	100%			
1957	D	100%		100%	
1958	W	100%			
1959	D	100%		100%	
1960	N	100%	100%		
1961	D	100%		100%	
1962	N	100%	100%		
1963	W	100%			
1964	D	100%		100%	
1965	W	100%			
1966	N	100%	100%		
1967	W	100%			
1968	N	100%	100%		
1969	W	100%			
1970	W	100%			
1971	N	100%	100%		
1972	D	100%		100%	
1973	W	100%			
1974	W	100%			
1975	N	100%	100%		
1976	D	100%		100%	
1977	D	100%			
1978	W	100%			
1979	N	100%	100%		
1980	W	100%			
1981	D	100%		100%	
1982	W	100%			
1983	W	100%			
1984	N	100%	100%		
1985	D	100%		100%	
1986	W	100%			
1987	D	100%		100%	100%
1988	D	100%			100%
1989	D	100%			100%
1990	D	95%			95%

1991	N	95%	95%		
1992	D	90%		90%	
1993	W	95%			
1994	D	95%		95%	
1995	W	100%			
1996	W	100%			
1997	W	100%			
1998	W	100%			
1999	N	100%	100%		
2000	N	100%	100%		
2001	D	100%		100%	
2002	N	100%	100%		
2003	N	100%	100%		
2003	W	100%			
2004	N	100%	100%		
2005	N	100%	100%		
2006	W	100%			
2007		100%			
Average		98%	99%	98%	89%

\*Includes first year of consecutive dry years

## Appendix B State Water Project Reliability

DWR Study 2009 data - SCWA Specific

Sacramento Valley Index

Value	Year Type
W	Wet
N	Below Normal
N	Above Normal
D	Dry
D	Critically Dry

Year	Sacramento Valley Index	% Full Table A	% Full Table A for Normal Year (N)	% Full Table A for Single Dry Year (D) *	% Full Table A for Multiple Dry Year (3 or more Dry years)
1922	N	0.37	0.37		
1923	N	0.84	0.84		
1924	D	0.26		0.26	0.26
1925	D	0.39			0.39
1926	D	0.49			0.49
1927	W	0.46			
1928	N	0.86	0.86		
1929	D	0.31		0.31	0.31
1930	D	0.36			0.36
1931	D	0.22			0.22
1932	D	0.35			0.35
1933	D	0.35			0.35
1934	D	0.24			0.24
1935	N	0.43	0.43		
1936	N	0.71	0.71		
1937	N	0.66	0.66		
1938	W	0.77			
1939	D	0.96		0.96	
1940	N	0.60	0.60		
1941	W	0.59			
1942	W	0.83			
1943	W	0.77			
1944	D	0.75		0.75	
1945	N	0.44	0.44		
1946	N	0.74	0.74		
1947	D	0.74		0.74	
1948	N	0.65	0.65		
1949	D	0.58		0.58	
1950	N	0.50	0.50		
1951	N	0.43	0.43		
1952	W	0.86			
1953	W	0.89			
1954	N	0.69	0.69		

1955	D	0.51		0.51	
1956	W	0.48			
1957	N	0.82	0.82		
1958	W	0.58			
1959	N	0.83	0.83		
1960	D	0.52		0.52	
1961	D	0.49			
1962	N	0.70	0.70		
1963	W	0.46			
1964	D	0.81		0.81	
1965	W	0.54			
1966	N	0.83	0.83		
1967	W	0.55			
1968	N	0.83	0.83		
1969	W	0.66			
1970	W	0.58			
1971	W	0.83			
1972	N	0.58	0.58		
1973	N	0.45	0.45		
1974	W	0.78			
1975	W	0.79			
1976	D	0.81		0.81	
1977	D	0.14			
1978	N	0.45	0.45		
1979	N	0.65	0.65		
1980	N	0.60	0.60		
1981	D	0.84		0.84	
1982	W	0.57			
1983	W	0.64			
1984	W	0.53			
1985	D	0.77		0.77	
1986	W	0.67			
1987	D	0.55		0.55	0.55
1988	D	0.24			0.24
1989	D	0.38			0.38
1990	D	0.42			0.42
1991	D	0.20			0.20
1992	D	0.20			0.20
1993	N	0.43	0.43		
1994	D	0.67		0.67	
1995	W	0.54			
1996	W	0.85			
1997	W	0.75			
1998	W	0.91			
1999	W	0.60			
2000	W	0.86			
2001	D	0.37		0.37	
2002	D	0.42			
2003	N	0.79	0.79		
Average		0.59	0.64	0.63	0.33

\*Includes first year of consecutive dry years